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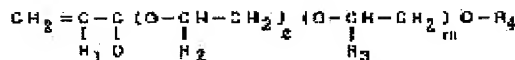
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(54) PRODUCTION OF LAMINATED GLASS

(57)Abstract:

PURPOSE: To produce the laminated glass which does not generate striae even at the time of using a thick interlayer of the laminated glass and has excellent physical properties by using a specific photosetting composition as the adhesive and irradiating the composition with ultraviolet rays under specific conditions to harden it.

CONSTITUTION: A photosetting composition consisting essentially of (a), (b) and (c) described below is used as the adhesive. As for the hardening conditions, the first irradiation by ultraviolet rays of a 10 to 1000mW/cm² light intensity at 360nm wavelength and a 1000 to 5000mJ/cm² integrated light quantity and, if necessary, the second irradiation by ultraviolet rays of a 0.1 to 10mW/cm² light intensity at 360nm wavelength are performed so that the total integrated light quantity of the first and second irradiation is at least 3000mJ/cm². (a) is e.g. a radicallypolymerizable compound represented by the formula, wherein each of R₁, R₂ and R₃ is a hydrogen atom or a methyl group; R₄ is a C₁ to C₁₂ alkyl group, etc.; (l) and (m) are 0 or ≥1 integers excluding the case of l=m=0. (b) is a non-radically-polymerizable compound such as polyalkylene glycol, etc., (c) is a photopolymerization initiator.



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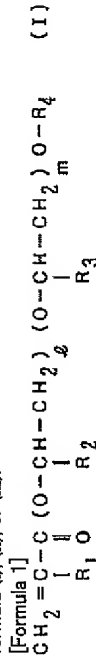
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CLAIMS

[Claim(s)]

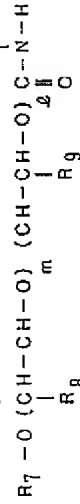
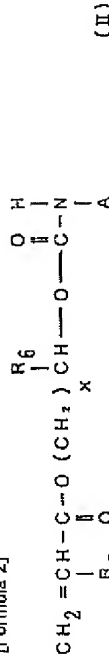
[Claim 1] Detach two or more glass of each other, form a crevice, and in this crevice The following compound (a), (b) Pour in a photosensitive constituent which uses (c) as the main ingredients, and light intensity in wavelength of 360 nm And 10 mW/cm² - 1000mW/cm²]². The 1st exposure that addition light volume irradiates with ultraviolet rays of 1000 mJ/cm² - 5000 mJ/cm², Perform the 2nd exposure that light intensity in wavelength of 360 nm irradiates with ultraviolet rays of 0.1 mW/cm² - 10 mW/cm² if needed, and this photosensitive constituent is stiffened, And a manufacturing method of doubling glass, wherein addition light volume of this 1st exposure and a total amount of addition light volume of this 2nd exposure performed if needed are 3000 mJ/cm² at least.

(a) At least one sort of radical polymerization nature compounds expressed with following general formula (I), (II), or (III).



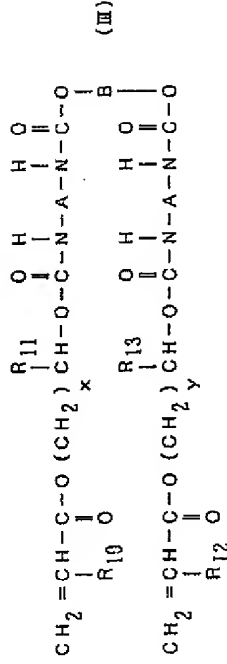
(As for the inside of the formula I, R₁, R₂, and R₃, in a hydrogen atom or a methyl group, and R₄, the alkylphenyl group which has an alkyl group of the carbon numbers 1-12 or an alkyl group of the carbon numbers 1-12, and l and m are 0 or one or more integers (however, except for l=m=0))

[Formula 2]



the inside of the formula II, R₅, R₆, and R₉ --- a hydrogen atom or a methyl group. A hydrogen atom or the alkyl group of the carbon numbers 1-12, and x R₈ One or more integers, Zero or one or more integers (however, except for l=m=0), and A of the alkylphenyl group with which R₇ has an alkyl group of the carbon numbers 1-12 or an alkyl group of the carbon numbers 1-12, and l and m are polyisocyanate residue.

[Formula 3]



(As for one or more integers and A, in a hydrogen atom or the alkyl group of the carbon numbers 1-12, x, and y, polyisocyanate residue and B are [the inside of the formula III, R₁₀, and R₁₂ / a hydrogen atom or a methyl group, R₁₁ and R₁₃] polyalkylene glycol residue)

(b) At least one sort of non-radical polymerization nature compounds chosen from a diether or diester of monoether of polyalkylene glycol and polyalkylene glycol or monoester, and polyalkylene glycol.

(c) A photopolymerization initiator.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the manufacturing method of the doubling glass especially used for the front glass of large-sized television about the manufacturing method of new doubling glass.

[0002]

[Description of the Prior Art] The doubling glass which piled up the glass plate of two or more sheets, and was pasted up is excellent from the field of safety, and is used for the glass for implosion prevention of the safe glass of a car, and large-sized television, etc. The interlayers (adhesives hardened material layer etc.) who intervene between the glass of such doubling glass are required to excel also in an adhesive property with glass with the tough nature which is not damaged even if glass breaks, and to have sufficient transparency.

[0003] After inserting and carrying out preparative pressure arrival of the resin layer object which serves as an interlayer between glass plates as one of the conventional methods which manufactures doubling glass, there is a method of performing final sticking by pressure warming in autoclave. However, this conventional method has a complicated process, in order to require autoclave processing, continuous production is difficult, and a manufacturing cost also becomes high.

[0004] As other conventional methods which manufacture doubling glass, a glass plate is piled up via a spacer. The seal of that end is carried out by resin sealant, such as rubber sheets, glue as a polyester tape and isobutylene isoprene rubber, or photo-curing type resin, a liquid glue constituent is poured in, and there is a method of stiffening this adhesive composition by heat or light. Since productivity is excellent compared with the method of using the above-mentioned autoclave, this conventional method is being put in practical use by manufacture of the glass for implosion prevention of television, etc.

[0005] The applicant for this patent applied previously about the adhesives for glass which comprise a specific component (JP 63-100045A). If these photo-curing type adhesives are used, the hardened material layer and glass of adhesives do not exfoliate, and doubling glass products with little hardening HIKE of a hardened material can be manufactured. Even when inferior goods arise on the glass obtained as a final product, it also becomes possible by carrying out the cutting part of sealant and an interlayer's adhesive setting thing safely to carry out the recovery reuse of the glass. In order to make internal stress accompanying cure shrinkage small as a method of stiffening these photo-curing type adhesives and to prevent exfoliation with a hardened material and glass, the method of using the lamp of low-power output and stiffening slowly was taken.

[0006]

[Problem(s) to be Solved by the Invention] However, in recent years, there are many demands of television which the request of enlargement of doubling glass products becomes strong further, and have a flat-surface screen wider than before for the use of the television especially using a CRT display. And in the doubling glass products used for this, the gap part to pile up was made thicker than before, namely, the adhesives hardened material layer needs to be thickened from several millimeters to maximum number cm. However, if an adhesives hardened material layer is thickened when it is made to harden slowly using the lamp of low-power output using the adhesives for glass which carried out point **, it will become easy to generate the optical nonuniformity which the convection of an adhesive composition takes place at the time of hardening, therefore is called a

"stria." Since an image is distorted in sight through doubling glass when this stria doubles and it exists in glass, the commodity value of television makes it fall greatly.

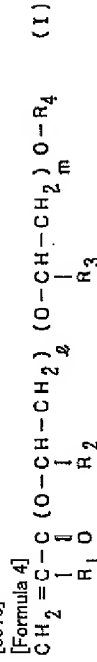
[0007] This invention is made that the technical problem of such conventional technology should be solved. Namely, the purpose of this invention aims at providing the manufacturing method of the doubling glass which a stria did not arise at even if it thickened the interlayer of doubling glass, and was excellent in physical properties.

[0008]

[Means for Solving the Problem] The purpose of describing this invention above detaches two or more glass of each other, forms a crevice, and in this device The following compound (a), (b) Pour in a photoresist constituent which uses (c) as the main ingredients, and light intensity in wavelength of 360 nm And 10 mW/cm² - 1000mW/cm²], The 1st exposure that addition light volume irradiates with ultraviolet rays of 1000 mJ/cm² - 5000 mJ/cm². Perform the 2nd exposure that light intensity in wavelength of 360 nm irradiates with ultraviolet rays of 0.1 mW/cm² - 10 mW/cm² if needed, and this photoresist constituent is stiffened. And it can attain with a manufacturing method of doubling glass, wherein addition light volume of this 1st exposure and a total amount of addition light volume of this 2nd exposure performed if needed are 3000 mJ/cm² at least.

[0009] (a) At least one sort of radical polymerization nature compounds expressed with following general formula (I), (II), or (III).

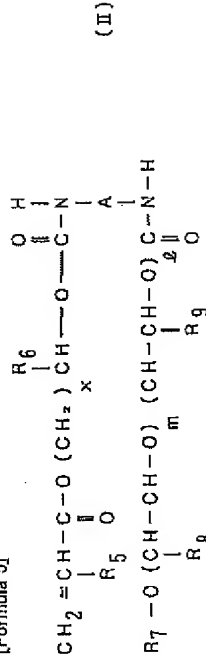
[0010]



(As for the inside of the formula I, R₁, R₂, and R₃ in a hydrogen atom or a methyl group, and R₄ the alkylphenyl group which has an alkyl group of the carbon numbers 1-12 or an alkyl group of the carbon numbers 1-12, and l and m are 0 or one or more integers (however, except for l=m=0))

[0011]

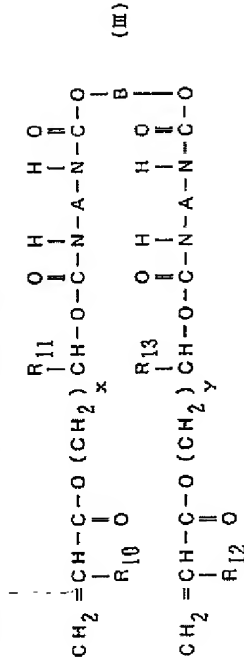
[Formula 5]



the inside of the formula II, R₅, R₆, and R₉ -- a hydrogen atom or a methyl group. A hydrogen atom or the alkyl group of the carbon numbers 1-12, and x R₆ One or more integers. Zero or one or more integers (however, except for l=m=0), and A of the alkylphenyl group with which R₇ has an alkyl group of the carbon numbers 1-12 or an alkyl group of the carbon numbers 1-12, and l and m are polyisocyanate residue.

[0012]

[Formula 6]



(As for one or more integers and A, in a hydrogen atom or the alkyl group of the carbon numbers 1-12, x, and y, polyisocyanate residue and B are [the inside of the formula III, R₁₀, and R₁₂ / a hydrogen atom or a methyl group, R₁₁, and R₁₃,] polvalkylene glycol residue)

(b) At least one sort of non-radical polymerization nature compounds chosen from the diether or diester of the monoether of polyalkylene glycol and polyalkylene glycol or monoester, and polyalkylene glycol.

[00137(c) Photopolymerization initiator.

[0014] After pouring of a photoresist constituent leaves an inlet and carries out the seal of the circumference of said crevice with a sealing material, it is more desirable than an inlet to pour in into said crevice.

[Function]Ingredient with a specific photoresist constituent used in this invention (a) - (c) Since it is considered as the main ingredients, ** . That the amount of **, cure shrinkage which **, hardened material with large adhesive strength of **, hardened material and glass which viscosity is low and injection work tends to carry out tends to cut is small etc. has the characteristic suitable as an interlayer of doubling glass.

[0016] Radical polymerization nature compounds [a] Ingredient are at least one sort of compounds expressed with said general formula (I), (II), or (III). The compound expressed with general formula (I) can be obtained as a condensate of the monoether of polyalkylene glycol, and acrylic acid (meta). The compound expressed with general formula (II) can be obtained as a reactant (urethane monoacrylate) of mole ratio 1 / 1 with the monoether of polyalkylene glycol, diisocyanate, and mono- hydroxyalkyl (meta) acrylate. The compound expressed with general formula (III) can be obtained as a reactant of mole ratio 1 / 2 of polyalkylene glycol, diisocyanate, and mono- hydroxyalkyl (meta) acrylate.

[0017]As for the loadings of a radical polymerization nature compound [(a) ingredient], 5 to 95 % of the weight is preferred. When these loadings are less than 5 % of the weight, it is in the tendency used as curing failure. On the other hand, if these loadings exceed 95 % of the weight, the contraction at the time of hardening will become large, and it is in the tendency for an interlayer to exfoliate from glass with the internal stress accompanying the difference of the coefficient of thermal expansion of the glass and the interlayer at the time of the internal stress at the time of hardening accompanying this and heating, and cooling.

[0018]The monomer of various radical polymerization nature compound [(a) ingredient] and oligomer can be used together within limits which do not spoil the effect of this invention for improvement of many performances. For example, carboxyl group content monomers, such as hydroxyl content monomers, such as 2-hydroxyethyl (meta) acrylate, and acrylic acid (meta), etc. can be used together for adhesive improvement with a hardened material and glass. For example, polyfunctional monomer of the versatility which serves as a bridge construction ingredient for the improvement in cohesive force of a hardened material, and oligomer can be used together. Alkyl (meta) acrylate, such as the general-purpose monomer of low cost, for example, 2-ethylhexyl (meta) acrylate etc. can be comparatively used together for a cost out.

[0019] Non-radical polymerization nature compounds [(b) Ingredient] are at least one sort of compounds chosen from diether or diester of the monoether of polyalkylene glycol and polyalkylene glycol or monoester, and polyalkylene glycol. This non-radical polymerization nature compound [(b) Ingredient] does so the operation which eases the cure shrinkage of a photoresist constituent based on the contraction at the time of hardening of a radical polymerization nature compound [(a) ingredient]. When using doubling glass for the glass for implosion prevention of large-

sized television especially, as a non-radical polymerization nature compound [(b) Ingredient]. A vapor rate is low and it is preferred for compatibility with a radical polymerization nature compound [(a) Ingredient] to be good, to carry out uniform dispersion into the hardened material of a radical polymerization nature compound [(a) ingredient] further, and to use the good thing of transparency.

[0020] As for the loadings of a non-radical polymerization nature compound [(b) Ingredient], 5 to 95 % of the weight is preferred. When these loadings exceed 95 % of the weight, it is in the tendency used as curing failure. On the other hand, if these loadings are less than 5 % of the weight, cure shrinkage will become large, and an interlayer is in the tendency for exfoliation to break out easily from glass.

[0021] various non-radical polymerization nature compounds other than this non-radical

polymerization nature compound [b] ingredient], for example, alcohols, ester species, ether, ketone, and hydrocarbon can also be used together within limits which do not spoil the effect of this invention.

[0022] While a photoresist constituent does a photoresist so by including the radical polymerization nature compound [a. Ingredient] and non-radical polymerization nature compound [b. ingredient] which has such a specific structure, the internal stress produced at the time of cooling is effectively removable at the time of the internal stress accompanying the contraction at the time of hardening, and heating.

[0023] A photopolymerization initiator [G. Ingredient] is an ingredient required in order to stiffen a photoresist constituent, it is independent, or is combined and is used. Specifically Benzoin propyl ether, benzoin ethyl ether, Benzyl dimethyl ketal, a phenylacetophenone, an acetophenone, A thioxan ton, anthraquinone, 2-ethylantraquinone, camphor quinone, 2-benzyl-2-dimethylamino 1-(4-morpholinophenyl) butan-1-one, 2-methyl[4-(methythio) phenyl]-2-morpholinopropane 1-one, 2-methyl[4-(methylthio) phenyl]-2-morpholino butan-1-one, Benzophenone, xantho fluorenone, benzaldehyde, 3-methylacetophenone, 4-chlorobenzophenone, 4,4'-diaminobenzophenone, 1-(4-isopropylphenyl)-2-hydroxy-isobutane 1-one, 2,4,6-trimethyl benzoyl-diphenyl phosphine oxide and hydroxy-2-methyl-1-phenylpropan-1-one etc. are mentioned. The photopolymerization initiator which has at least one aryl/vinyl group or a methacryloyl group can also be used into molecule.

[0024] Depths hardenability will become good if the photopolymerization initiator which has an absorption wavelength in not less than 360 nm is used. It also becomes possible to double by this and to make still thicker the interlayer (hardened material layer of a photoresist constituent) of glass.

[0025]The loadings of a photopolymerization initiator [c] Ingredient have 0.01 – 10 desirable weight section, and also its 0.01 – 3 weight section is preferred. These loadings are in the tendency as for which a cure rate becomes extremely slow in less than 0.01 weight sections. On the other hand, when these loadings exceed ten weight sections, it is in the tendency which poses an exterior problem for coloring by the initiator itself.

[2026] In a photosensitive constituent, in order to raise an adhesive property with glass, especially the thing for which a silane coupling agent is added is effective. As this silane coupling agent, what are more publicly known than before various can be used. However, the thing of the point of a water resisting property and the temporal stability of adhesives to gamma-glycidyloxy propyl trimethoxy SHIRANTAPU is preferred. The adhesive property of a middle hardened material and glass can also be raised by performing silane coupling agent treatment for the surface of glass beforehand.

[0027] Into a photoresist constituent, it can also perform adding various colors, paints, etc. that design nature should be given to doubling glass in the range which does not spoil many performances according to a use.

[0028]Next, the mode of the manufacturing method of the doubling glass of this invention is explained in detail, referring to drawing 1 – drawing 3.

[0029] In this invention, as first shown in drawing 1 and drawing 2, two or more glass of each other is detached, a crevice is formed, and a photoresist constituent is poured in into the crevice. Drawing 1 is a top view showing the state where the crevice between the glass plates of two sheets was filled up with the photoresist constituent, and drawing 2 is a sectional view of the A-A' line of drawing 1. In this mode, the sealing material 2 which served as the spacer to the peripheral edge (except for the portion used as the inlet 4) of the glass plate 1 which is one side first is given, glass plate 1' of another side is piled up on it, and it joins by the sealing material's 2 adhesive strength in these glass plates 1 and 1' of two sheets. Next, it is poured in and filled up with the photoresist constituent 3 from the inlet 4.

[0030]It is not limited to inorganic glass in this glass 1 and 1. For example, various kinds of publicly known materials which set a polymethacrylate board, a polycarbonate board, etc. from before, and are used for glass can be used.

[0031]This sealing material 2 should just be the material which can carry out the seal of the photoresist constituent to a device, for example, a tape, a rubber sheet, adhesive resin, etc. can use him. It is preferred to use especially the material which has the various characteristics of adhesive strength with glass being able to be large, and the residual stress being absorbed, and being constituent which is easy to cut, and with which it fills up between glass being absorbed, and being able to follow in footsteps of contraction accompanying hardening of a photoresist constituent. Since the total amount of the volume change accompanying contraction of a photoresist constituent will become large if the thickness of the hardened material layer of a photoresist constituent especially increases, it is desirable to carry out a seal on tapes, such as a polyester tape, and to use rubber sheets, resin sealant, etc., such as isobutylene isoprene rubber, as a spacer of four corners.

[0032]The photoresist constituent 3 can also be used as the sealing material 2. If this photoresist constituent is especially used as the sealing material 2, it is hard to produce exfoliation by the interface of an interlayer and the sealing material 2, and suitable.

[0033]Next, as shown in drawing 3, the 2nd UV irradiation is performed and stiffened 1st [UV irradiation and if needed] to the photoresist constituent 3 with which the device was filled up, and doubling glass is obtained. Drawing 3 is a mimetic diagram showing the situation of photo-curing processing of doubling glass. In this mode, the photoresist constituent 2 is stiffened by the 1st and 2nd UV irradiation from the light source 5, and the doubling glass with which the glass plate 1, the hardened material of the adhesive composition 3, and glass plate 1' were united is obtained.

[0034]Generally the light with which it irradiates here is the ultraviolet rays belonging to 250 nm - 450 nm of wavelength areas. As this light source 5, although lamps with a radiation wavelength of 200-450 nm, such as a low pressure mercury lamp, a high-pressure mercury-vapor lamp, are light, and a gallium lamp, are effective, a high-pressure mercury-vapor lamp, a metal halide lamp, the electrodeless lamp by a fusion company, etc. are highly suitable for an output to the start of hardening especially, and a chemical lamp etc. are suitable for continuation of hardening at low-power output.

[0035]The 1st exposure is performed, when the light intensity in the wavelength of 360 nm irradiates with $10 \text{ mW/cm}^2 - 1000 \text{ mW/cm}^2$, and addition light volume irradiates with the ultraviolet rays of $1000 \text{ mJ/cm}^2 - 5000 \text{ mJ/cm}^2$. Hardening of a photoresist constituent begins by this 1st exposure. Even if it thickens a hardened material layer according to this 1st exposure, the light intensity of the transmitted light is enough, the photopolymerization initiators in a photoresist constituent are enabled to excite all at once to all the corners of an adhesives hardened material layer, and hardening reactions begin all at once. Therefore, the convection of the adhesive composition by which it is generated from the hardening reaction nonuniformity of the hardened material layer of a photoresist constituent does not take place. The 1st exposure can also be performed two or more times if needed.

[0036]In the 1st exposure, when the light intensity in the wavelength of 360 nm is less than 10 mW/cm^2 , a stria occurs that a hardened material layer is a thick film which is several centimeters. On the other hand, if this exceeds 1000 mW/cm^2 , the energy which becomes useless will increase, a device becomes large more than needed, and a manufacturing cost goes up. In the 1st UV irradiation, when addition light volume is less than 1000 mJ/cm^2 , it becomes easy to produce a stria. On the other hand, if this exceeds 5000 mJ/cm^2 , the energy which becomes useless will increase and a manufacturing cost will go up.

[0037]The 2nd UV irradiation is immediately performed after the 1st exposure if needed. The light intensity in the wavelength of 360 nm is $0.1 \text{ mW/cm}^2 - 10 \text{ mW/cm}^2$, and this 2nd UV irradiation is performed so that the total amount of the addition light volume of the 1st and the 2nd exposure may become 3000 mJ/cm^2 at least. By performing this, a residual monomer can be reduced with sufficient energy efficiency, and the physical properties of a hardened material can be raised.

[0038]This 2nd exposure is performed if needed. This is indispensable when the addition light volume of the 1st exposure is less than 3000 mJ/cm^2 , but even when the 1st exposure is more than 3000

mJ/cm^2 , it may carry out. It is in the tendency for the time which a stria becomes easy to generate when the 2nd exposure is less than 0.1 mW/cm^2 , and hardening takes to become long too much. Since a stria will occur in the meantime and it will be easy to become unsuitable as goods if the time from the 1st exposure to the 2nd exposure reaches in several minutes, when the 1st exposure is completed, it is desirable to perform the 2nd exposure promptly.

[0039]In the case of hardening of the adhesive composition for glass in this invention, $3000 \text{ mJ/cm}^2 - 100,000 \text{ mJ/cm}^2$ are preferred in 360 nm as addition light volume of the light with which it irradiates. When addition light volume is less than 3000 mJ/cm^2 , it becomes insufficient hardening an adhesive setting thing, or a stria arises. Since the energy which becomes useless will increase in a hardening reaction if it glares exceeding $100,000 \text{ mJ/cm}^2$, and since it is in the tendency for irradiation time to become long and for productivity to worsen, it is not desirable.

[0040]

[Example]Hereafter, an example explains this invention in detail further. A "weight section" is meant unless a "part" mentions specially in the following statements.

[0041]<Example 1> (preparation of adhesives for sealing materials) polypropylene-glycol monobutyl ether (the Sanyo Chemical Industries, Ltd. make.) 30 copies of urethane acrylate which obtained them by making trade name new pole LB-385, isophorone diisocyanate, and 2-hydroxypropyl acrylate react by mole ratio 1 / 1/1, polyethylene-glycol nonylphenyl acrylate (the Toagosei chemical industry incorporated company make.) Trade name ARONIKUSU M-111 100 copy, 100 copies of 2-hydroxyethyl methacrylate, polyethylene-glycol methyl methacrylate (the Shin-Nakamura Chemical Co., Ltd. make.) trade name NK-ester M-90G10 copy and polypropylene-glycol monobutyl ether (the Sanyo Chemical Industries, Ltd. make.) trade name new pole LB-65 30 copy and a silane coupling agent (made in Union Carbide.) Trade name A-1871 copy, one copy of photopolymerization initiator (the Ciba-Geigy make, trade name DAROKYUA 1173), and the adhesives for sealing materials that consist of thixotropic grant agent (product [made by Japanese Aerosil] and trade name Aerosil #300) 8 copy were prepared.

[0042](Preparation of a photoresist constituent) polypropylene-glycol monobutyl ether (the Sanyo Chemical Industries, Ltd. make.) 30 copies of urethane acrylate which obtained them by making trade name new pole LB-385, isophorone diisocyanate, and 2-hydroxypropyl acrylate react by mole ratio 1 / 1/1, polyethylene-glycol nonylphenyl acrylate (the Toagosei chemical industry incorporated company make.) Trade name ARONIKUSU M-111 50 copy, 50 copies of 2-hydroxyethyl methacrylate, polyethylene-glycol methyl methacrylate (the Shin-Nakamura Chemical Co., Ltd. make.) trade name NK-ester M-90G10 copy and polypropylene-glycol monobutyl ether (the Sanyo Chemical Industries, Ltd. make.) The photoresist constituent for device restoration which consists of trade name new pole LB-65 60 copy, one copy of silane coupling agent (made in Union Carbide, trade name A-187), and one copy of photopolymerization initiator (the Ciba-Geigy make, trade name DAROKYUA 1173) was prepared.

[0043](Manufacture of doubling glass) Doubling glass as shown in drawing 1 - drawing 3 was produced as follows.

[0044]It covered with Saran Wrap on unprocessed glass (120x120x2 mm) first, and the sealing material which prepared previously so that it might be set to 23 mm in height was applied. Put Saran Wrap on it and the same unprocessed glass of a size, it was stuck by pressure so that the thickness between glass might be set to 20 mm, and it glared for 20 minutes with the chemical lamp (the Mitsubishi Electric Corp. make, the fluorescent lamp for photochemistry, trade name NEORUMI super floor line40SBL-360), and the sealing material was stiffened. Next, the sealing material was stripped and it started to 20 mm long, 20 mm wide, and a 20-mm-high wafer. Glass 1' of the same size was stuck for these sections to four corners of the unprocessed glass (840x840x3 mm) 1 by pressure in piles every every other one. And the inlet part of the upper center was opened 50 mm, and the ceiling of the glass of two sheets was carried out on the 40-mm-wide polyester tape, 3-mm-thick doubling glass was produced similarly.

[0045]Subsequently, the inlet was turned for the two above-mentioned kinds of samples up, the glass plate was stood vertically, the photoresist constituent previously prepared between each glass plate of two sheets was poured in, and the polyester tape closed the inlet.

[0046]After making rectangular directions pass through the bottom of the high-pressure mercury-

vapor lamp of 80 W/cm³ light the speed for 2-m/, with the level maintenance of these glass plates carried out, the complete package exposure was immediately carried out for 40 minutes with the chemical lamp, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0047]After producing the glass plate (layered product) completely like <Example 2> example 1 and making rectangular directions pass through the bottom of the high-pressure mercury-vapor lamp of 80 W/cm³ light the speed for 1-m/, the complete package exposure was immediately carried out for 30 minutes with the chemical lamp, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0048]Produce a glass plate (layered product) completely like <Example 3> example 1, rectangular directions were made to pass through the bottom of the high-pressure mercury-vapor lamp of 80 W/cm³ light twice the speed for 1-m/, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0049]After producing the glass plate (layered product) completely like <Example 4> example 1 and making rectangular directions pass through the bottom of the high-pressure mercury-vapor lamp of 50W/cm³ x3 light the speed for 1-m/, the complete package exposure was immediately carried out for 40 minutes with the chemical lamp, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0050]Produce a glass plate (layered product) completely like <Example 5> example 1, rectangular directions were made to pass through the bottom of the high-pressure mercury-vapor lamp of 50 W/cm³ light 3 times the speed for 1-m/, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0051]Except having used the polymethylmethacrylate board instead of <Example 6> unprocessed glass, produce a glass plate (layered product) completely like Example 1, rectangular directions were made to pass through the bottom of the high-pressure mercury-vapor lamp of 50 W/cm³ light 3 times the speed for 1-m/, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0052]Except having used the polycarbonate board instead of <Example 7> unprocessed glass, produce a glass plate (layered product) completely like Example 1, rectangular directions were made to pass through the bottom of the high-pressure mercury-vapor lamp of 50 W/cm³ light 3 times the speed for 1-m/, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0053]Produce a glass plate completely like the <comparative example 1> example 1, rectangular directions were made to pass through the bottom of the high-pressure mercury-vapor lamp of 80 W/cm³ light the speed for 2-m/, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0054]The glass plate was produced completely like the <comparative example 2> example 1, the package exposure was carried out for 90 minutes with the chemical lamp, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0055]After producing the glass plate completely like the <reference example 1> example 1 and making rectangular directions pass through the bottom of the high-pressure mercury-vapor lamp of 80 W/cm³ light the speed for 2-m/, the complete package exposure was carried out for 40 minutes with the chemical lamp 5 minutes afterward, the photoresist constituent was stiffened, it doubled, and glass was obtained.

[0056]The result evaluated about the state of the stria of <evaluation> above-mentioned each example, a comparative example, and a reference example and adhesion with a substrate is shown in Table 1. As shown in this table, not to mention that whose thickness of a hardened material layer is 3 mm, a stria did not appear but the 20-mm thing of Examples 1-7 was also good. Since a stria arises on the other hand in that whose adhesive setting layer thickness of a comparative example and a reference example is 20 mm, and a stria is in a usual picture area when it is CRT of this test size, practical use is not borne. In the comparative example 1, the adhesive property with a substrate was also inferior.

[0057]

[Table 1]

実施例 1	20mm厚さ		○	○	○	第1の照射の強度 (mJ/cm ²) (360nm)	第1の照射の積算光量 (mJ/cm ²) (360nm)	第2の照射の強度 (mJ/cm ²) (360nm)	第2の照射の積算光量 (mJ/cm ²) (360nm)	1.2	2900	3900
	20mm厚さ	3mm厚さ										
表材との接着性*2	○	○	○	○	○	80	80	1000	1000	1.2	2900	3900
	○	○	○	○	○	80	80	2000	2400	1.2	4400	4400
	○	○	○	○	○	80	80	4000	0	—	4000	4000
	○	○	○	○	○	80	80	1500	2900	1.2	4400	4300
	○	○	○	○	○	50	50	4300	0	—	4300	4300
	○	○	○	○	○	50	50	4300	0	—	4300	4300
	○	○	○	○	○	50	50	4800	0	—	4300	1000
比較例 1	×	○	×	○	×	80	80	1000	0	—	0	6400
	×	×	×	×	×	1.2	6400	0	0	—	0	6400
2	×	×	×	×	×	80	80	1000	0	—	0	3900
2	×	×	×	×	×	80	80	1000	0	1.2	2900	3900

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. *** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a top view showing the state where the photoresist constituent was poured into the crevice between the glass plates of two sheets.

[Drawing 2] It is a sectional view of the A-A' line in drawing 1.

[Drawing 3] It is a mimetic diagram showing the situation of photo-curing processing of doubling glass.

[Description of Notations]

- 1 and 1' glass plate
- 2 Sealing material
- 3 Photoresist constituent
- 4 The inlet of a photoresist constituent
- 5 Lamp

[Translation done.]